REMARKS

Claims 1-18 and 23-29 are pending. In the Office Action, the Examiner rejected claims 1-18 and 23-29 as being unpatentable under 35 U.S.C. §102(e) and §103(a). In response, Applicants submit the following remarks.

Rejection Under 35 U.S.C. §102(e)

In paragraph 5, the Examiner rejected claims 1-18 and 23-29 as being anticipated by U.S. Patent No. 6,204,856 to Wood et al. (hereinafter Wood). Applicants respectfully traverse.

In order to properly establish a rejection under 35 U.S.C. §102(e), a reference must teach every element of the claimed invention either explicitly or impliedly. *See* MPEP §706.02. A reference may be overcome by persuasively arguing that the claimed invention is patentably distinguishable over the cited prior art. *See* MPEP §706.02(b).

Claim 1 of the present invention recites in part, "receiving a signal from an interface, the signal comprising data about a plurality of vertices of the primitive ***and an independent variable***", which is supported by the specification as filed (emphasis added). The Examiner cited Wood as anticipating this element of claim 1, stating, "Wood discloses input to receive attribute data of the vertices, col. 5, lines 32-35." However, the cited passage from Wood merely states, "the main attribute processor 10 having an input to receive data in the form of an indexed face set of triangular polygons making up an image, with the main *attributes comprising 3D (view-space) coordinates for the triangle vertices*" (emphasis added). Wood receives data about triangle vertices, but does not disclose ***an independent variable*** as in claim 1. There is no discussion anywhere in Wood disclosing receiving data about an independent variable. Because this element of

the claimed invention is not present, Applicants maintain that Wood does not anticipate claim 1 of the present invention.

Claim 1 further recites in part, "determining a channel value for each of the plurality of vertices of the primitive using the data about the plurality of vertices ***and the independent variable***" (emphasis added). The Examiner cited Wood as anticipating this element of claim 1, stating, "Wood discloses determining a parameter value of a position within a triangle *from the attribute value at each vertex*, col. 2, lines 6-19" (emphasis added). In the pertinent part of this passage, Wood merely discloses, "the determined parameter values at positions within the triangle determine contributions *from the stored values for one or more attributes at each vertex*, to give attribute values at each pixel" (emphasis added). Wood discloses determining values based upon values at triangle vertices, but does not disclose ***an independent variable***, as discussed above. Because the independent variable is not disclosed by Wood, there is no discussion or disclosure in Wood of determining a channel value...using data about the plurality of vertices ***and the independent variable***." Applicants maintain that Wood does not disclose this element of claim 1.

Claim 1 of the present invention additionally recites, in part, "***randomly*** selecting an interior point within the graphic primitive" (emphasis added). The Examiner cited Wood as anticipating the "randomly selecting" element of claim 1, stating, "Wood discloses determining parameter values for positions within a triangle, col. 2, lines 12-14." The cited portion of Wood states,

> during projection, a generalised interpolation function is applied in terms of the parameterising coordinate system, *determining parameter values at positions within the triangle in terms of the two-dimensional coordinate system*;and, following projection, the determined parameter

> values at positions within the triangle determine contributions from the stored values for one or more attributes at each vertex (col. 2 line 10-17, emphasis added).

In further explaining the method of "determining parameter values at positions within the triangle", the specification of Wood elaborates, "the magic point is selected at 510, for which point s/z, t/z, and 1/z are calculated," col. 10, lines 31-32. Relative to the "magic point", in the Response to Arguments at paragraph 8 of the Office Action, the Examiner stated, "Wood discloses in figure 5, element 510, choosing a point. It is inherent that the (sic) if one selects a point *without a pattern or unsystematically*, the point chosen is chosen at random, see figure 1, Wood" (emphasis added).

However, Applicants respectfully submit that in contrast to the assertion of the Examiner, the method of Wood does not disclose selecting a point without a pattern or unsystematically. In defining the magic point, Wood states,

> "[a]s a control feature, a so-called 'magic' point is identified. The magic point *is co-incident with a pixel center...and is required to be inside the triangle's bounding box and on-screen.* The *magic point is determined as part of the triangle to tile segmentation procedure.* Since, as mentioned above, triangles do not need to be clipped, *the magic point calculation is the same for all triangles*, whether entirely on-screen or partially on-screen" column 4, lines 56-65 (emphasis added).

Therefore, the method of Wood is not without pattern or unsystematic. Wood determines points that are simultaneously at a pixel center, on screen, within a triangle, and impacting a tile.

Further analyzing the method of Wood as described in Figure 5 supports the conclusion that Wood selects points systematically, and further requires processing tiles, which is altogether different than the method of the instant invention. Wood explains, "[a]s tile-based rendering is used, scan conversion is undertaken at 506 to *convert each*

triangle to a series of tiles...at 508, an *identifier is assigned to each triangle*... [f]ollowing on from the assignment of an identifier for a triangle, *the magic point is selected*" (col. 10 lines 22-31).

Therefore, Wood does not determine points randomly, but rather with a systematic method. Wood determines points that are simultaneously at a pixel center, within a triangle, on screen, and impacting a tile, as shown in Wood figure 2.

In the Response to Arguments section at paragraph 8 of the Office Action, the Examiner relies on Wood figure 1 as depicting a "point chosen at random" within a triangle. However, in describing the point depicted in Figure 1, Wood only "illustrates the parameterising in the view space plane of a triangle with a point inside the triangle having co-ordinates s and t" (col. 3, lines 39-41 emphasis added).

Depicting a single point as lying within a triangle in a figure does not disclose or suggest that the point must be identified by "randomly selecting" as required by claim 1, and does not teach that the point can or should be chosen at random. There is no discussion or suggestion in Wood, explicitly or impliedly disclosing the "randomly selecting an interior point" element in claim 1 of the present invention. As noted above, Wood does not select points within the triangle "randomly", but rather *with a pattern or systematically*, by first converting triangles to tiles, assigning identifiers to the triangles, and selecting magic points at a pixel center within the tile-based triangle. After performing this method, Wood requires sequentially processing tiles or pixels. Furthermore, the disclosure of Wood does not include the word "random" and does not suggest that points could or should be selected randomly.

The Examiner further stated in the Response section, "[i]t is further inherent that if the invention of Woods (sic) determines values for interior points within a triangle, the invention of Woods (sic) meets Applicant's claim limitation of random points, because the interior points selected are selected at random and any interior point, random points, adjacent points, etc., within a polygon can be determined." However, as discussed above, merely because a point is selected within a triangle does not mean that the point was selected randomly. The method of Wood does not select points randomly, but only selects points that are simultaneously at the pixel center, on screen, within a triangle, and within a tile. The method of Wood furthermore requires that subsequent interpolation to additional points is only sequential or incremental.

Because claim 1 requires random selection of points, it would not "read on" the method described in Wood, and the method of Wood does not anticipate claim 1.

Further distinguishing the instant invention from the prior art, the method of sequential point selection as described in Wood is one failure of the prior art addressed by the instant invention. Wood determines "values at positions within the triangle" (column 2, lines 12-13), using "*incrementally interpolated* attributes for each triangle" (column 5, lines 53-55, emphasis added). Wood explains that triangle parameters "can be incrementally interpolated to an *adjacent* pixel, from there to another *adjacent* pixel and so on" (column 6, lines 5-7, emphasis added), wherein "[i]*ncremental interpolation* uses *one pixel steps* in x and y" (column 6, lines 19-20, emphasis added).

These failures of the prior art are noted in the specification of the instant application. "Traversal is most often accomplished by sequentially scanning rows within the graphic primitive, and using linear interpolation to determine a value at each point on

each row. See, for example, Foley, et al., Computer Graphics: Principles and Practice" (specification, page 3 lines 13-16).

Sequential or incremental interpolation is in direct contrast to the purpose of the instant invention, as taught in the specification. "[P]erforming interpolation on an incremental or point-by-point basis...can be an expensive process" (at page 3 line 23 to page 4 line 1). The specification also teaches,

> [a]nother disadvantage of conventional systems is that the rasterization stage requires sequential traversal of scan lines within the primitives. In some applications, where a value for a given pixel location within a primitive may be needed, it may be inefficient to perform lengthy traversal operations of large portions of the primitive in order to determine the desired value (application page 4, lines 16-20).

In contrast to the prior art, the instant invention can determine channel values for randomly selected points, and then eliminates the sequential interpolation limitation by "direct interpolation to generate a value *for any point* in a graphic primitive without necessarily traversing other portions of the primitive" (page 5, line 7-8, emphasis added). "[T]he method of the present invention will determine, using direct (i.e., non-incremental) perspective or linear interpolation, values for unknown parameters at that position" (page 6, line 11-13).

> [T]his technique facilitates computation on an as-needed basis, so that any required computations for other portions of the primitive may be deferred until needed. ***Pixels may be generated in any convenient order, without the sequential limitations of incremental methods***. The resulting flexibility increases efficiency for implementations of more advanced features or techniques...[such as] reordering pixel drawing, and therefore are more effective when ***computation may be performed on an as-needed or random-access basis*** (page 6 line 23 – page 7 line 5, emphasis added).

In summary with respect to claim 1, Applicants submit that Wood does not teach the elements of "receiving a signal...comprising data about...**an independent variable**,"

"determining a channel value...using the data about the plurality of vertices and ***the independent variable***," and "***randomly*** selecting an interior point" as required in the method of independent claim 1. Because Wood does not teach all elements of the present invention, claim 1 is patentably distinct and should be allowed.

Independent claims 8-9, 13-15, 23 and 27 were rejected on similar rationale as claim 1. These claims each include the limitation of "randomly" selecting an interior point. Because these independent claims recite at least one limitation that is not taught or suggested by Wood, these claims are not anticipated thereby and should be allowed. For example with respect to claim 14, the Examiner stated, "it is rejected based upon similar rational (sic) as above independent claim 1. Wood further discloses interpolation means, data handling means, calculation means, projection means, and pixel shading means, col. 2, lines 46-67." Whereas Wood may disclose those elements, it does not disclose all elements of claim 14. Independent claim 14 recites in part, "a router coupled to the interpolation engine and configured to transmit the output ratio signal to an input of at least one of the plurality of agents." This feedback loop is depicted in figures 3 and 4 of the instant specification, and described at page 20, lines 16-20. There is no discussion in Wood of a feedback loop from a router back to one of the agents, as required in this claim element. Because not all elements are taught, Wood does not anticipate claim 14.

Dependent claims 2-7 and 28-29, which depend directly from claim 1 and inherit all the limitations thereof, are patentable over Wood for at least the reasons advanced above in connection with claim 1. Dependent claims 10-12 and 16-18, which depend directly or indirectly from claim 9, and dependent claims 24-26, which depend directly

from claim 23, are similarly patentable over Wood for at least the reasons advanced above in connection with claim 1.

Rejection under 35 U.S.C. §103(a)

On page 6 of the Office Action at paragraph 7, the Examiner rejected claims 1-18 and 23-29 under 35 U.S.C. §103(a) as being unpatentable over "Computer Graphics Principles and Practice" by Foley et al. (hereinafter Foley), in view of U.S. Patent Number 6,108,007 to Shochet (hereinafter Shochet). Specifically, the Examiner stated that "Foley discloses and (sic) equation that selects a random point, Ip and draws a horizontal line...to determine the value of the randomly selected interior point Ip, see figure 16.19." The Examiner further noted that Foley "fails to disclose receiving a signal from an interface with channel values or parameter data", but contended that Shochet discloses "data comprising an image sample and further discloses the data consisting of a single channel value, col. 2. lines 35-64, and further discloses an interpolator unit and determining an interpolated pixel value." The Examiner concluded that it "would have been obvious to one of ordinary skill in the art at the time of the invention of Foley to include means for receiving the three-dimensional graphics data through the interface of Shochet because it is necessary to include input data for graphics processing." Applicants respectfully traverse.

Claim 1 discloses "***randomly*** selecting an interior point within the graphic primitive" which is supported by the specification as filed (emphasis added). In similar fashion described above with respect to Wood, Applicants submit that Foley, Shochet, or the combination of the two does not disclose ***randomly*** selecting an interior point within

the graphic primitive at which to determine an interpolated channel value. Thus, all claim limitations are not taught as required by MPEP §706.02(j). Further, the combination of receiving a signal from an interface and ***randomly*** selecting an interior point within the graphic primitive are neither suggested, taught, nor motivated by the cited references.

The Examiner cited Foley figure 16.19 as having a "randomly selected interior point Ip". As described above with respect to Wood, just because a figure depicts a single point does not mean that the point was selected ***randomly***. Foley teaches sequentially processing scan lines, and interpolating across scan lines in sequential order, stating, "[w]ith each edge, we store...for *each unit change* in y. A visible *span* on a scan line is filled in..." (Foley, at 737, emphasis added). Foley requires line-by-line traversal in sequential or sequentially-related order to fill in a *span* across a line, rather than determining channel values for ***any randomly selected*** point. As Foley specifically requires sequential interpolation, Applicants submit that Foley fails to teach, motivate, or suggest ***randomly selecting*** a point. As described above with respect to claim 1, the instant invention eliminates this sequential processing requirement.

Further, the combination of receiving a signal from an interface and ***randomly*** selecting an interior point within the graphic primitive are neither suggested, taught, nor motivated by the cited references. The Examiner noted that Foley "fails to disclose receiving a signal from an interface with parameter data", but contended that Shochet discloses "data comprising an image sample" and "further discloses an interpolator unit and determining an interpolated pixel value." However, Shochet is directed to "increasing interpolation bit precision using multi-channel texture mapping...provided in

limited-precision graphics hardware" (abstract), wherein, "[i]n most sampling operations, first and second pixels 200 and 201 are *adjacent pixels*..." (column 4, lines 31-33). The interpolation unit in Shochet merely manipulates data values of *adjacent pixels* in order to synthesize higher bit precision using lower precision equipment. There is no disclosure in Shochet of receiving a signal from an interface and ***randomly*** selecting an interior point of a graphic primitive as in claim 1 of the present invention.

The Examiner concluded that it "would have been obvious to one of ordinary skill in the art at the time of the invention of Foley to include means for receiving the three-dimensional graphics data through the interface of Shochet because it is necessary to include input data for graphics processing."

However, neither Foley nor Shochet nor the combination of the two references suggests "***randomly selecting*** an interior point" as required in claim 1 of the present invention. The claimed invention permits ***random access to any point*** within a graphic primitive, in opposition to the methods of Foley and Shochet, which require burdensome sequential scan line-by-scan line traversal.

Applicants submit that both Foley and Shochet fail to teach, motivate, or suggest the claimed invention. Applicants submit that the Examiner has not stated a prima facie case of obviousness. Claim 1 is nonobvious in light of the cited references and is in condition for allowance. Claims 8, 9, 13-15, 23, and 27 were rejected upon similar rationale as claim 1, and should be allowed for the reasons shown in claim 1 above.

If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Therefore, claims 2-7, and 28 and 29, dependent upon claim 1, are

nonobvious. Similarly, claims 10-12 and 16, which depend upon claim 9; claim 17, which depends on claim 10; claim 18, which depends on claim 11; and claims 24-26, which depend upon claim 23, should also be allowed as nonobvious under *In re Fine*.

CONCLUSION

Applicants respectfully submit that the rejections of all claims by the Examiner in the Office Action of September 4, 2003 have been traversed. In particular, the above remarks demonstrate that Wood does not anticipate all elements of the claimed invention. Neither Foley nor Shochet, either individually or in combination, teach all of the claim limitations in the claimed invention. Further, there is no suggestion or motivation to combine the references to yield the claimed invention. Thus, upon consideration of the above remarks, Applicants submit that the application is in condition for allowance, and respectfully request the issuance of a Notice of Allowability.

Respectfully submitted,

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